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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/780,108	02/17/2004	Qing Yang	022193-010611US	6491

20350 7590 11/20/2006

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EXAMINER

DILLER, JESSE DAVID

ART UNIT	PAPER NUMBER
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2187

DATE MAILED: 11/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/780,108

Applicant(s)

YANG, QING

Examiner

Jesse Diller

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>4/12/04, 11/14/05</u> . | 6) <input checked="" type="checkbox"/> Other: <u>Cited NPL</u> . |

DETAILED ACTION

1. Claims 6-23 are pending in the application, and have been examined.

Priority

2. Applicant's claim for priority under 35 USC § 119 to PCT/US02/26292, filed 08/15/2002. As for Applicant's claim for priority under 35 USC § 119(e) to US 60/312,471, this is the application on which the PCT is based.

Information Disclosure Statement

3. The Information Disclosure Statements filed 04/12/2004 and 11/14/2005 have been considered by the Examiner. Initialed and dated copies of the PTO-1449s are attached hereto.

Oath/Declaration

4. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

Non-initialed and/or non-dated alterations have been made to the oath or declaration. See 37 CFR 1.52(c).

Non-initialed alterations were made to the title.

Drawings

5. The drawings received on 08/26/2004 are accepted.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

6. Claims 6-23 are rejected under 35 U.S.C. 102(a) as being anticipated by Xubin He, Quin Yang, “Architecture and Performance Potential of STICS – SCSI-To-IP Cache Storage”, 2001, hereinafter He.

7. As for claim 6, He teaches:

- A cache storage system for communicably coupling a host computing device to a switched packet network, the cache storage system comprising:
- a small computer system interface (SCSI) that facilitates system communication with the host computing device (page 4, last par.); a network interface that facilitates system communication with the switched packet network (page 5, par. 2); a processing unit that facilitates communication between the SCSI and the network interface (page 5, par. 3), the processing unit comprising a processor and a buffer;
- a log disk coupled to the processing unit (page 5, par. 4), wherein
- the log disk and the buffer are configured as a two-level hierarchical cache (Section 2.2, first par.) such that least recently used data in the buffer is

transferred to the log disk before more recently accessed data is stored in the buffer (section 2.4.3, third par.),

- the data being transferred from the buffer to the log disk when one of: the amount of data in the buffer exceeds a threshold value or the log disk is idle(section 2.4.3, 1st. Par.);
- and a storage device that receives data from and provides data to the two-level hierarchical cache (Fig. 2; also Page 5, par. 5).

8. As for claim 7, He teaches:

- wherein the host computing device is configured to send a request to the processing unit via the SCSI (Fig. 1; also Page 4, last par.)

9. As for claim 8, He teaches:

- the request is a write request such that in the event that the buffer includes an entry associated with the write request, the entry is overwritten with data associated with the write request (section 2.4.1, par. 2).

10. As for claim 9, He teaches:

- the request is a write request such that in the event that the buffer does not include an entry associated with the write request, data associated with the write request is stored in the buffer(section 2.4.1, par. 2).

11. As for claim 10, He teaches:

- the request is a read request such that data associated with the read request is retrieved from one of: the buffer, the log disk, or the storage device, and forwarded to the host computing device (page 9, par. 1).

12. As for claim 11, He teaches:

- wherein the request is a read request such that the read request is forwarded to a remote cache storage system communicably coupled to the switched packet network, data associated with the read request being returned to the host computing device via the network interface (page 9, pars. 1-2).

13. As for claim 12, He teaches:

- wherein the processing unit is configured to receive, via the network interface, a request from a remote cache storage system communicably coupled to the switched packet network (section 2.4.1, par. 1; also section 2.4.2, par. 1).

14. As for claim 13, He teaches:

- The cache storage system of claim 12, wherein the request is a write request such that in the event that the buffer includes an entry associated with the write request, the entry is overwritten with data associated with the write request (section 2.4.1, par. 3).

15. As for claim 14, He teaches:

- The cache storage system of claim 12, wherein the request is a write request such that in the event that the buffer does not include an entry associated with the write request, data associated with the write request is stored in the buffer (section 2.4.1, par. 3).

16. As for claim 15, He teaches:

- The cache storage system of claim 12, wherein the request is a read request such that data associated with the read request is retrieved from one of: the

buffer, the log disk, or the storage device, and forwarded to the remote cache storage system via the network interface (section 2.4.2, par. 3).

17. As for claim 16, He teaches:

- The cache storage system of claim 6, wherein the buffer comprises random access memory (Fig. 3).

18. As for claim 17, He teaches:

- The cache storage system of claim 6, wherein in the event that the amount of data in the log disk exceeds a threshold, a portion of the data is transferred from the log disk to a remote cache storage system coupled to the switched packet network via the network interface (section 2.4.3, pars. 1 and 3).

19. As for claim 18, He teaches:

- The cache storage system of claim 6, wherein the remote cache storage system is operating at the lowest processing load relative to other remote cache storage systems communicably coupled to the switched packet network (section 2.4.3, par. 3).

20. As for claim 19, He teaches:

- A method for storing data in a cache storage system, the method comprising:
- receiving data at a processing unit, wherein the data is sent from one of: a host computing device via a SCSI or a first remote cache storage system communicably coupled to a switched packet network via a network interface (section 2.4.1, par. 1);
- storing the received data in a buffer (section 2.4.1, par. 2);

- transferring data from the buffer to a log disk when one of: the amount of data in the buffer exceeds a threshold value or the log disk is idle (section 2.4.1, par. 2), wherein the transferred data is the least recently used data in the buffer (section 2.4.3, par. 2: data is written sequentially); and
- in the event that the amount of data in the log disk exceeds a threshold, transferring, via the network interface, a portion of the data from the log disk to a second remote cache storage system storage system communicably coupled to the switched packet network (section 2.4.3: level 2 destage).

21. As for claim 20, He teaches:

- The method of claim 19, wherein the second remote cache storage system is operating at the lowest processing load relative to other remote cache storage systems communicably coupled to the switched packet network (section 2.4.3, par. 3).

22. As for claim 21, He teaches:

- A method for storing data in a cache storage system, the method comprising: receiving a read request at a processing unit, wherein the read request is sent from a requesting device, the requesting device being one of: a host computing device or a first remote cache storage system communicably coupled to a switched packet network, the host computing device sending the read request via a SCSI, the first remote cache storage system sending the read request via a network interface (see Fig. 2, also Section 2.4.2);

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- retrieving data associated with the read request from one of: a buffer in the processing unit, a log disk coupled to the processing unit, a storage device coupled to the processing unit, or a second remote cache storage system communicably coupled to the switched packet network and transferring the retrieved data to the requesting device (Section 2.4.2, par 2); and
- transferring data from the buffer to the log disk when one of: the amount of data in the buffer exceeds a threshold value or the log disk is idle, wherein the transferred data is the least recently used data in the buffer (section 2.4.3: destage).

23. As for claims 22-23, He further teaches:

- in the event that the amount of data in the log disk exceeds a threshold, transferring, via the network interface, data from the log disk to a third remote cache storage system communicably coupled to the switched packet network, wherein the third remote cache storage system is operating at the lowest processing load relative to other remote cache storage systems communicably coupled to the switched packet network (Section 2.4.3, par. 3: level 3 destage).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

24. Claims 6-10, 16, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over “DCD – Disk Caching Disk: A New Approach for Boosting I/O Performance,” by Hu et al., hereinafter DCD, in view of “VISA: Netstation’s Virtual Internet SCSI Adapter”, by Van Meter et al., hereinafter VISA.

25. As for claim 6, DCD discloses:

- A cache storage system comprising: a processing unit comprising a processor and a buffer (Fig. 1: controller, RAM Buffer);
- a log disk coupled to the processing unit (Cache Disk), wherein the log disk and the buffer are configured as a two-level hierarchical cache such that least recently used data in the buffer is transferred to the log disk before more recently accessed data is stored in the buffer (Section 2), the data being transferred from the buffer to the log disk when one of: the amount of data in the buffer exceeds a threshold value or the log disk is idle (Section 2.1, Par. 2); and
- a storage device that receives data from and provides data to the two-level hierarchical cache (Fig. 1, Data Disk).

26. DCD does not expressly disclose:

- The cache storage system is for communicably coupling a host computing device to a switched packet network;
- the cache storage system comprises: a small computer system interface (SCSI) that facilitates system communication with the host computing device and
- a network interface that facilitates system communication with the switched packet network;
- the processing unit facilitates communication between the SCSI and the network interface.

27. VISA discloses a system

- for communicably coupling a host computing device to a switched packet network (see Fig. 2; the VISA module couples the host and the network) comprising
- a small computer system interface (SCSI) that facilitates system communication with the host computing device (see Fig. 2; sd is a SCSI bus adapter, therefore a SCSI interface is inherent in the VISA module; see also Section 5, 3rd par.) and
- a network interface that facilitates system communication with the switched packet network (see section 5, par. 4; also Fig. 2, . the VISA module sends data over the packet network, therefore an interface is inherent);
- the system facilitates communication between the SCSI and the network interface (Section 5, Par. 1; also Fig. 2).

28. DCD and VISA are analogous art because they are from the same area of endeavor, namely systems which are related to increasing storage system performance.

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29. At the time of the invention it would have been obvious to a person of ordinary skill in the art to utilize the system of DCD in the VISA module's environment.

30. The motivation for doing so is that intermediate network caching is well known in the computer storage systems arts. Proxy servers, for instance, are widely used as caches between a host and a remote data source. The DCD system, if applied to the VISA module, could eliminate many network data calls and increase performance drastically. This is noted in DCD, in the abstract, which notes that performance increases of up to two orders of magnitude have been noted when using the DCD system.

31. Therefore, it would have been obvious to combine the disk-caching-disk system of DCD with the SCSI-to-IP interface of VISA, for the benefit of increased performance, to obtain the invention as specified in claim 6.

32. As for claim 7, the combination of DCD and VISA also teach:

- the host computing device is configured to send a request to the processing unit via the SCSI (see VISA: sc, Fig. 2, forwards SCSI requests to the PU).\

33. As for claim 8, the combination of DCD and VISA also teach:

- wherein the request is a write request such that in the event that the buffer includes an entry associated with the write request, the entry is overwritten with data associated with the write request (see DCD, Section 2.3, Par. 3, lines 7-9; also see holes, Fig. 4).

34. As for claim 9, the combination of DCD and VISA also teach:

- the request is a write request such that in the event that the buffer does not include an entry associated with the write request, data associated with the write request is stored in the buffer (see DCD: normal write operation; section 2.1).

35. As for claim 10, the combination of DCD and VISA also teach:

- the request is a read request such that data associated with the read request is retrieved from one of: the buffer, the log disk, or the storage device, and forwarded to the host computing device (DCD: section 2.2).

36. As for claim 16, the combination of DCD and VISA also teach:

- The buffer comprises RAM (see Fig. 1, DCD)

37. As for claim 21, DCD teaches:

- A method for storing data in a cache storage system, the method comprising: receiving a read request at a processing unit, wherein the read request is sent from a requesting device (see Fig. 1: requests received via interface), the requesting device being one of: a host computing device or a first remote cache storage system communicably coupled to a switched packet network (see page 170, left column, second from last line: "appears to the host"),
- retrieving data associated with the read request from one of: a buffer in the processing unit, a log disk coupled to the processing unit, a storage device coupled to the processing unit, or a second remote cache storage system communicably coupled to the switched packet network (see section 2.2);
- transferring the retrieved data to the requesting device (section 2.2); and

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- transferring data from the buffer to the log disk when one of: the amount of data in the buffer exceeds a threshold value or the log disk is idle (section 2.3: destage), wherein the transferred data is the least recently used data in the buffer (Section 2.3, par. 3: LWFD).

38. DCD does not expressly disclose:

- the host computing device sending the read request via a SCSI, the first remote cache storage system sending the read request via a network interface;

39. **VISA discloses a system**

- for communicably coupling a host computing device to a switched packet network (see Fig. 2; the VISA module couples the host and the network) comprising
 - a small computer system interface (SCSI) that facilitates system communication with the host computing device (see Fig. 2; sd is a SCSI bus adapter, therefore a SCSI interface is inherent in the VISA module; see also Section 5, 3rd par.) and
 - a network interface that facilitates system communication with the switched packet network (see section 5, par. 4; also Fig. 2, . the VISA module sends data over the packet network, therefore an interface is inherent);
 - the system facilitates communication between the SCSI and the network interface (Section 5, Par. 1; also Fig. 2).

40. DCD and VISA are analogous art because they are from the same area of endeavor, namely systems which are related to increasing storage system performance.

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41. At the time of the invention it would have been obvious to a person of ordinary skill in the art to utilize the system of DCD in the VISA module's environment.

42. The motivation for doing so is that intermediate network caching is well known in the computer storage systems arts. Proxy servers, for instance, are widely used as caches between a host and a remote data source. The DCD system, if applied to the VISA module, could eliminate many network data calls and increase performance drastically. This is noted in DCD, in the abstract, which notes that performance increases of up to two orders of magnitude have been noted when using the DCD system.

43. Therefore, it would have been obvious to combine the disk-caching-disk system of DCD with the SCSI-to-IP interface of VISA, for the benefit of increased performance, to obtain the invention as specified in claim 21.

Conclusion

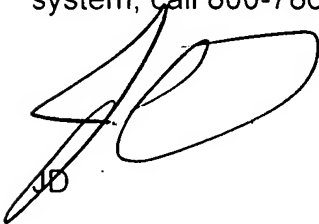

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See the attached PTO-892. **Lim et al., SAINT '03**, references the He document and discloses a hierarchical proxy server setup using iSCSI. **Soltis, US 20020083120 A1**, discloses a system using multiple SCSI-to-IP interface units, both local and remote.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse Diller whose telephone number is (571) 272-4173. The examiner can normally be reached on 9:30AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on (571) 272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to be 'JD' or similar initials, with a large loop.A handwritten signature in black ink, appearing to be 'Donald Sparks', with a large loop.

DONALD SPARKS
SUPERVISORY PATENT EXAMINER